Climate Action Tracker

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CAT rating methodology

Detailed description of the Climate Action Tracker rating methods

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CLIMATE ANALYTICS

NEW CLIMATE INSTITUTE

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1 Introduction

1.1 Why has the CAT updated its rating methodology?

When the CAT started in 2009, we rated ONLY a government's targets against what would contribute a 'fair share'. Since then, many things have changed. The Paris Agreement has been adopted, we better understand what needs to be done, and yet at the same time, global emissions have continued to rise.

With limited action to reduce emissions so far, the remaining carbon budget is much lower than it used to be 10 years ago and it's now necessary that *all* countries immediately get on track for full decarbonisation to meet the Paris Agreement 1.5˚C temperature goal.

However, according to many fair share assessments, it would be considered fair that some countries continue emitting at high levels. We are now in a situation where these countries can no longer follow a high emissions path, but other, richer countries do need to help them to rapidly decarbonise.

We've also seen that it's not only targets that matter, but the policies that governments put in place to meet those targets. The CAT not only evaluates government targets, but we also provide an estimate of countries' emissions given implemented action (current national policies)[1] and now integrate this information in our rating.

This year, we've expanded our rating system to take a more granular look at what governments are doing at the national level. Our new analysis and rating system provides a much more informative and complete assessment of climate action in each country. It not only looks at targets but also at real action and disentangles what part of the action should be done within the country or outside, with or without support from others.

1.2 What is the new CAT rating method designed to tell us?

The CAT's new rating method evaluates a broad spectrum of government actions to reduce greenhouse gas emissions in line with the Paris Agreement temperature limit.

Governments should commit to reducing their own emissions and follow through on those commitments by implementing policies that reduce emissions to meet those targets. These actions in a country can be assessed against what is realistic and necessary from a physical and economic basis, usually a globally cost-efficient perspective.

However, for many countries, what is realistic either falls short of what would be expected of them based on principles of fairness, or is beyond what is possible with domestic resources alone. Fair share principles mean that governments need to support each other in achieving the global mitigation goals.

Our new assessment framework therefore combines both fair share and cost-efficient mitigation perspectives to assess the different components of government actions.

With this framework we're able to identify whether:

- Government promises for action in their country are ambitious with respect to global least-cost mitigation pathways, acknowledging that most developing countries will need support to achieve this level
- Government promises for action in their country with their own resources and, if relevant, the financing of action abroad represent a fair contribution to global efforts
- Governments are providing sufficient support to others OR are making plans to use support provided by others

1 We consider as "current policies" those that are likely to have an effect on greenhouse gas emissions. Usually they are adopted by the government and there are also signs that they are in the process of being implemented.

- Governments are putting in place real policies and action in line with global least-cost mitigation pathways and are on track to meeting their promises.

Here we explain in detail the basis for each of these evaluation systems, how we apply them to individual countries, and how the different rating components are brought together to define the overall CAT rating.

The CAT continues to focus its rating on mitigation efforts but recognises that adaptation and support for adaptation and loss and damage are also vital in meeting the Paris Agreement.

1.3 What is the new rating based on?

The CAT uses two key concepts as the basis for our evaluation of country efforts: fairness, and necessary emissions reductions to meet the Paris Agreement's 1.5˚C temperature limit.

1.3.1 Fairness

To assess fairness, we integrate a range of fair share principles to establish the CAT fair share rating system. Effort-sharing principles include concepts of

- historical responsibility for past emissions
- the capacity to pay for emissions reductions
- potential for reducing emissions
- sharing emissions on an equal per capita basis
- the need for sustainable development

The CAT fair share rating approach combines quantitative assessments from the literature, supplemented with our own calculations. We developed the approach for the IPCC Fifth Assessment Report (Clarke *et al.*, 2014; Höhne *et al.*, 2014) and have since refined it. This year, we've included some new studies in our literature database and modified how we calculate the fair share ranges – see here for a detailed description.

The CAT fair share framework defines allowed emissions for each country that, when applied by all countries within a global system, would result in specific warming levels. This allows us to give a fair-share temperature rating for countries' efforts in reducing emissions.

1.5°C compatible fair share emissions allocations for developed countries can be very stringent, and if met through domestic action alone, would imply rapid reductions to around zero in the next decade or less. Developed countries are therefore much more likely to meet their fair share emission allocations by a combination of domestic action and international financial support for mitigation abroad.

Conversely, for many developing countries, their fair share emissions allocation will exceed where their emissions need to be for full decarbonisation aligned with the 1.5°C warming limit, meaning that they should be supported to develop with low emissions and to decarbonise at the pace necessary.

To meet the Paris Agreement 1.5˚C temperature goal, all countries need to reduce their emissions to collectively meet global net zero around mid-century. This means it would usually make more sense for developed countries to fulfil their fair shares through a combination of 1.5°C compatible domestic action and the provision of substantial support for emission reductions in developing countries.

1.3.2 Modelled domestic pathways

We have therefore now added an additional reference framework to our assessment that explores what a government would need to do in a world where emissions are reduced in a globally cost-effective manner.

For the CAT rating system, we downscale the regional results of integrated assessment model, global least-cost scenarios from the IPCC to the national level, based on each countries' economic structure, GDP, and population. We call these downscaled scenarios **'modelled domestic pathways'**. See here for more details.

The CAT now uses both perspectives – fair shares and modelled domestic pathways – to evaluate countries policies, actions, and targets in a more comprehensive manner.

To complete the picture, we also look at the **support provided** by richer countries to those that need it. Under the **fair share rating**, many developed countries would need to achieve very stringent emissions reductions to be rated as Paris Agreement compatible, so stringent that these reductions are considered highly unlikely, or unviable.

On the other hand, other countries, such as The Gambia, Ethiopia, or Kenya, are given a good fair share rating despite continued, or rising, emissions that are inconsistent with the need to reduce global emissions rapidly. Those countries need support to reduce their emissions, but should nevertheless still be orienting their actions and targets toward full decarbonisation.

The CAT evaluates each of these components (policies, targets, and support) separately and then combines these into a single rating with an explanation of what the country needs to do to improve its rating.

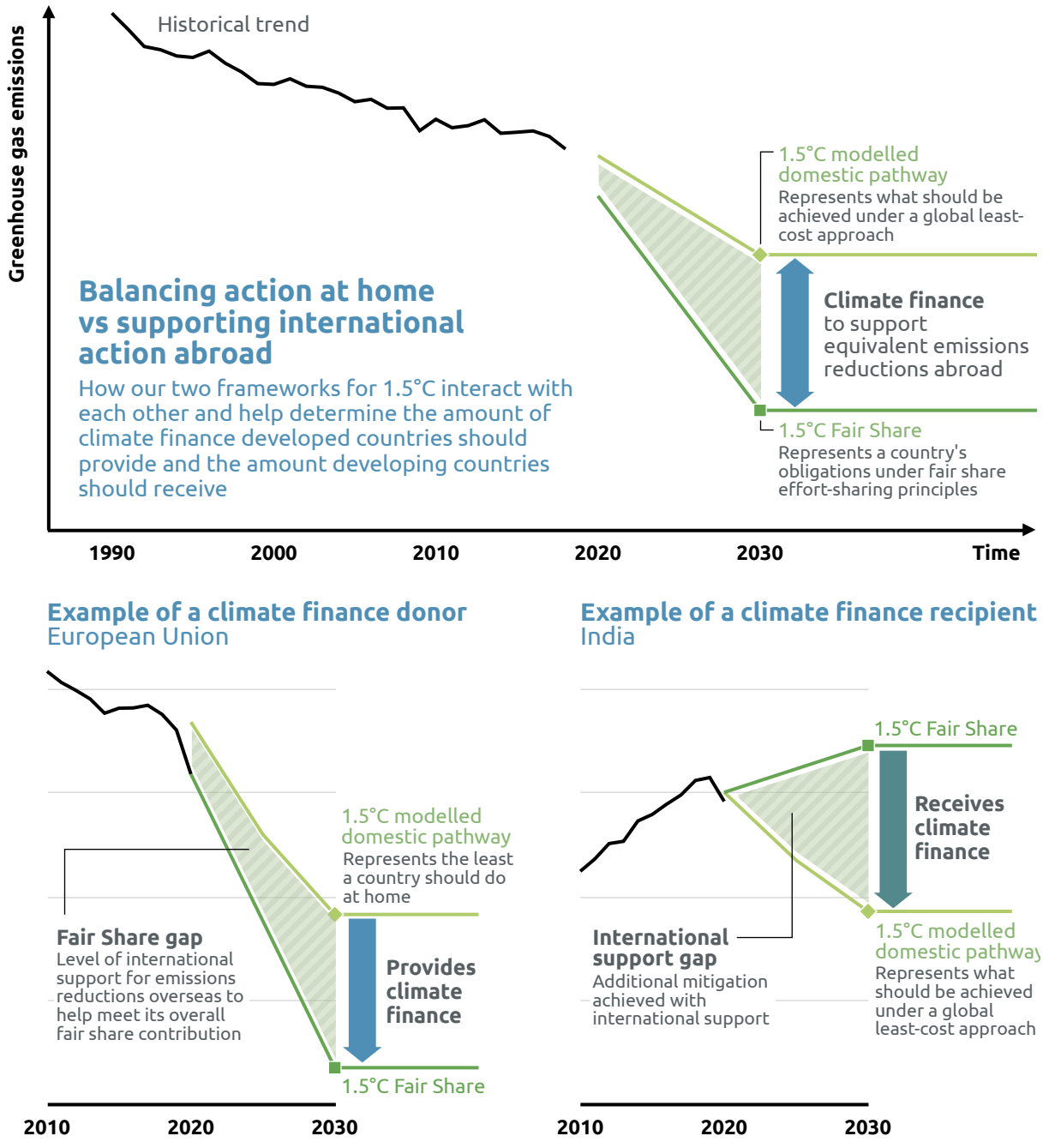

Figure 1: Additional mitigation obligation for developed countries to go beyond their modelled domestic pathway and meet their fair share through additional domestic mitigation and / or supporting others to reduce emissions

1.4 Rating components

A country's climate action has many components; different types of targets and policies put in place, depending on the national circumstances and emissions sources. Combined with our two rating frameworks, this gives us several elements that make up our rating, providing a detailed overview of what is happening in each country.

In all cases we rate targets and policies, but we rate them slightly differently depending on whether – and how much – support is likely to be needed by a country to reach full decarbonisation.

1.4.1 Policies and action

Policies and action refer to what is actually happening in a country to reduce emissions – what emissions levels do we expect if all current policies are fully implemented? Policies and action are important because they tell us:

- If a government is following through on its promises
- Where emissions are actually heading
- If a country is already achieving its promises and could strengthen them further

We rate a government's policies and action against the framework that is most favourable to it – fair share or modelled domestic pathways. We do this because those who can do more with their own resources should, but we don't expect countries to do more than their fair share without appropriate support.

1.4.2 Domestic and internationally supported targets

We evaluate targets for what countries want to achieve within their own borders, some with international support, against our modelled domestic pathways. Depending on whether a country needs support to fully decarbonise, we perform this evaluation slightly differently.

Domestic targets: For countries that should be supporting others, or can do it alone, we evaluate the domestic part – what the country will do on their own territory - of its Nationally Determined Contribution (NDC), submitted under the Paris Agreement. If an NDC doesn't specify that part of the emissions reduction target is to be achieved outside the country's own borders, we assume that the NDC target is domestic only.

Internationally supported targets: For countries that need to receive support to fully decarbonise, we evaluate the conditional NDC: what a government plans to do if it receives international support. Countries that don't have a conditional NDC are rated using their unconditional NDC and are encouraged to develop a conditional NDC, outlining the support they need.

The modelled domestic pathway-based target 'temperature' rating reflects the warming we would expect if all countries' targets fell on an emissions pathway consistent with limiting warming to that level in a globally cost-effective way. "Globally least-cost" means that, in the model, emission reductions are achieved wherever they are cost effective to do so, in a way that minimises the total global cost of meeting a climate target using whatever metric is applied in specific models.

Global least-cost scenarios do not entail equal marginal or relative costs for all regions and countries (Bauer *et al.*, 2020). It's therefore important to also look at how countries can share costs and how they can do so fairly, taking into account measures such as capability and responsibility, which is what we do in our next step.

1.4.3 Fair share target

Here we evaluate a government's international target - what it has promised to do with its own resources within its own territory or outside – against our fair share pathways.

When a country's fair share 1.5 pathway is much more stringent than the modelled domestic pathway, usually the case for developed (Annex I) countries, it can be difficult for that country to reduce emissions fast enough to meet the 1.5 fair share target. If it can't meet the fair share goal within its own borders, it at least needs to meet a goal consistent with the 1.5 modelled domestic pathway.

Then, to make up its fair share, it should fund and support emissions reductions elsewhere, ether as an internationally achieved part of their target[2] or through direct financial transfers. If a country wants to go beyond its least cost domestic pathway at home and reduce its finance support obligations abroad, that may also work, but many countries are unlikely to be able to make the full emission reductions required for their fair share contribution in this way.

A government may choose to work with others through bilateral agreements to achieve emissions reductions jointly, or it can provide climate mitigation finance. Some governments have made promises to reduce emissions at home and pay for concrete emissions reductions elsewhere, to use towards their reduction targets. (e.g., a country wants to reduce 50%, of which 30 %-points are to be achieved at home and 20 %-points through bilateral agreements). We then rate these combined components against the fair share pathways. In the next step, we evaluate climate finance provided through direct financial transfer.

Many developing country government targets specify what it will do at home under its own resources, often referred to as an 'unconditional target'. We rate this target against the fair share pathways as this provides its fair contribution.

The fair share 'temperature' rating reflects the warming we would expect if all countries were to meet targets with a similar level of effort as defined by the fair share pathways.

1.4.4 Climate finance

A government whose fair share obligations are difficult, or even impossible, to meet with its target is expected to meet its fair share internationally through funding and supporting emission reductions in other countries through direct financial resources. We include here only the direct financial transfers; the implied transfers accounted against the reduction target are already covered under the fair share target.

We assess four aspects of climate mitigation finance provided:

- Absolute contributions – how much finance has a government provided in relation to its fair share obligations?
- Contribution trends – are the government's contributions increasing through time?
- Future commitments – has the government committed to providing (more) finance in the future?
- Overseas fossil fuel finance – has the government stopped investing in overseas fossil fuel projects?

Read more about our methods for rating climate finance and see detailed results in Section 5.

As noted above, the CAT rating system evaluates mitigation actions only. It is essential that countries also provide adequate climate finance for adaptation and loss and damage, but we do not currently have a methodology for assessing that.

1.4.5 Net zero targets

Net zero targets are important – they can be used by governments to signal their intent to full decarbonisation. But, as always, the devil lies in the detail: a net zero target can range from being robust to just masquerading as ambition.

We provide an assessment of the comprehensiveness and transparency of governments' net zero targets as part of their complete climate action efforts. We have developed a ten-step "good practice" evaluation methodology that looks at the scope, architecture, robustness and transparency of government net zero targets.

However, a country's net zero target doesn't affect its overall CAT rating as it is near-term efforts that will be decisive in meeting the long-term goals. Without a strong near-term target, a country is highly unlikely to be able to meet its net zero target. 2030 is the key date.

2 International allowance transfers or offsets would only be Paris compatible in the rare cases that they move the originating countries emissions well below what the country would have to achieve with own resources.

1.4.6 Land use and forestry

The CAT doesn't include land use and forestry in its main rating assessment. Emissions and removals from forestry are of very different nature, they are very volatile from one year to the next and the removals during biomass growth can be reversed into emissions through human activity, natural factors, and increasingly through the effects of climate change on forests and soil carbon via more extreme and frequent heat waves, drought and wildfire. We consider it is more important to make clear what's happening with emissions from fossil fuels and industry rather than mixing targets with sinks through land use and forestry. Find more explanation on why we don't include land and forest emissions here.

However, reducing emissions from deforestation or land degradation is also important and, in some countries, land use and forestry are a major contributor to overall emissions. We flag countries whose land use and forestry emissions – or sinks – play a big role or might impact reaching their NDC.

1.5 Example countries – Japan and Ethiopia

In the figures below you can see example analyses for two countries in quite different situations – Japan and Ethiopia.

Japan has a domestic target that we rate as "Almost sufficient". Japan's NDC doesn't distinguish between efforts at home and abroad, so the same emissions level is assessed as its fair share target, where it is rated as "Insufficient".

Japan's policies and action are not yet enough to meet its 2030 target and so Japan needs to strengthen both its target, and its policies and action to at least meet the 1.5 modelled domestic pathway at home. Japan also needs to improve its climate finance (currently rated "critically insufficient") and / or work with other countries to reduce emissions abroad.

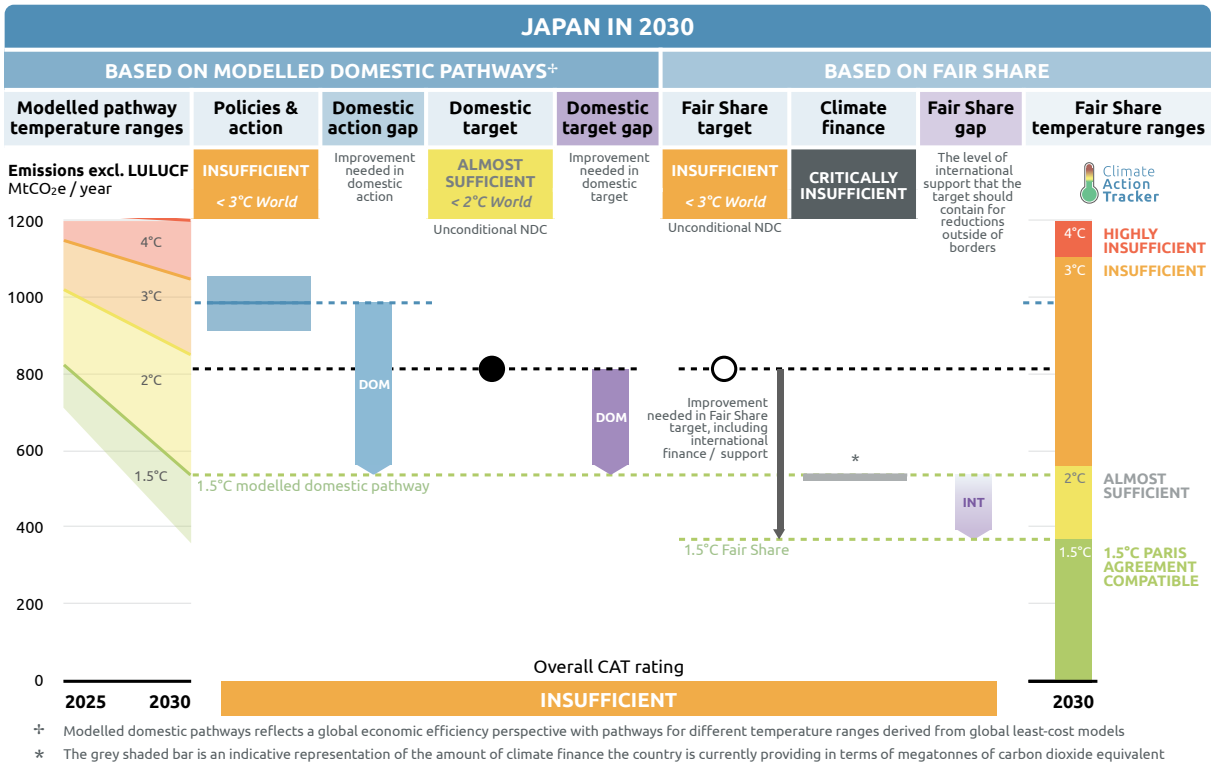

Figure 2: Countries like Japan need to reach their 1.5 modelled domestic pathway with domestic targets and policies. They then need to provide climate finance to meet their fair share.

With low responsibility for past emissions and limited capacity, Ethiopia's emissions would not be limited in any way from a fair share perspective. Because of this, the fair share target and policies and action are rated as 1.5C Paris Agreement compatible.

However, under current policies, Ethiopia's emissions would continue to increase, which is inconsistent with getting on track for full decarbonisation. Ethiopia needs international support to reduce its emissions and get its policies and action in line with the 1.5 modelled pathway. The government could put forward a stronger conditional NDC to improve its "internationally supported target" rating.

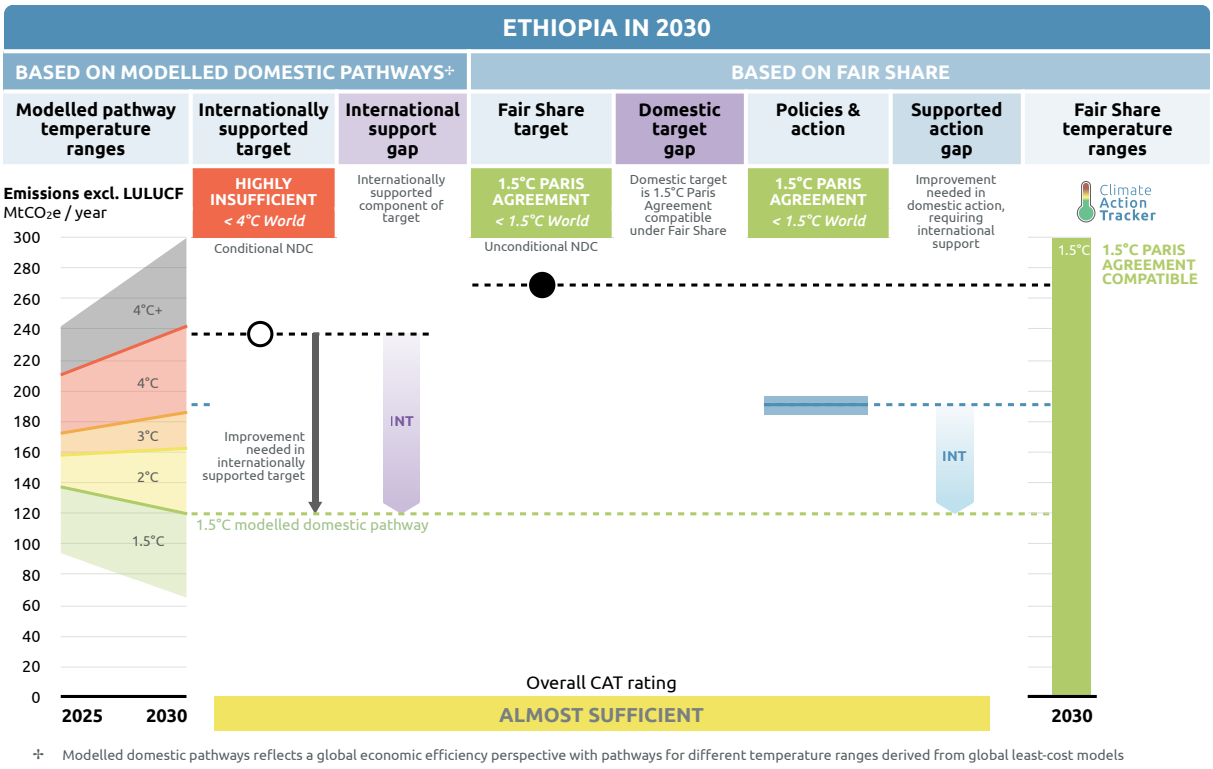

Figure 3: Countries like Ethiopia easily meet their 1.5 fair share with targets and policies but need to put forward a conditional target that outlines the additional support they need to fully decarbonise.

1.6 Combined rating

1.6.1 So, after all of the above, how do we determine an overall rating for a country?

All aspects of climate mitigation action are important – targets, policies, climate finance. So we rate them separately and then combine these components for all into a single "overall" rating.

Some principles used for defining the final rating are:

- Both **Policies and action**, and **targets**, are important – governments must do well on both to get a good rating. Both are given equal weight.
- Both the fair-share and full decarbonisation perspectives are important – governments should do well in both spaces to provide their fair contribution and get on track toward full decarbonisation. Both spaces are given equal weight as far as possible when combining different elements.

A government's **current policies** are rated against what we expect that country to do within its borders under its own resources. Some countries need support to advance their current policies and so we rate their current policies according to fair-share contributions. Others can reduce emissions without support from others and we rate those countries against what's needed for full decarbonisation.

Country **targets** are rated as a package – we combine the two target ratings (domestic or internationally supported target and the fair share target) by averaging. For countries with a climate finance rating, we first combine the fair share target rating and climate finance rating – a good climate finance rating can help to improve the fair share target rating.

To get the **overall rating**, we combine these policies and targets ratings by averaging. Where a country falls between two categories, we take the poorer rating because countries need to be acting on all fronts to fully meet their climate contributions and get a good rating.

Finally, some countries have particular circumstances that we also take into account, such as not specifying an unconditional target. These considerations are explained or highlighted on the country page where relevant.

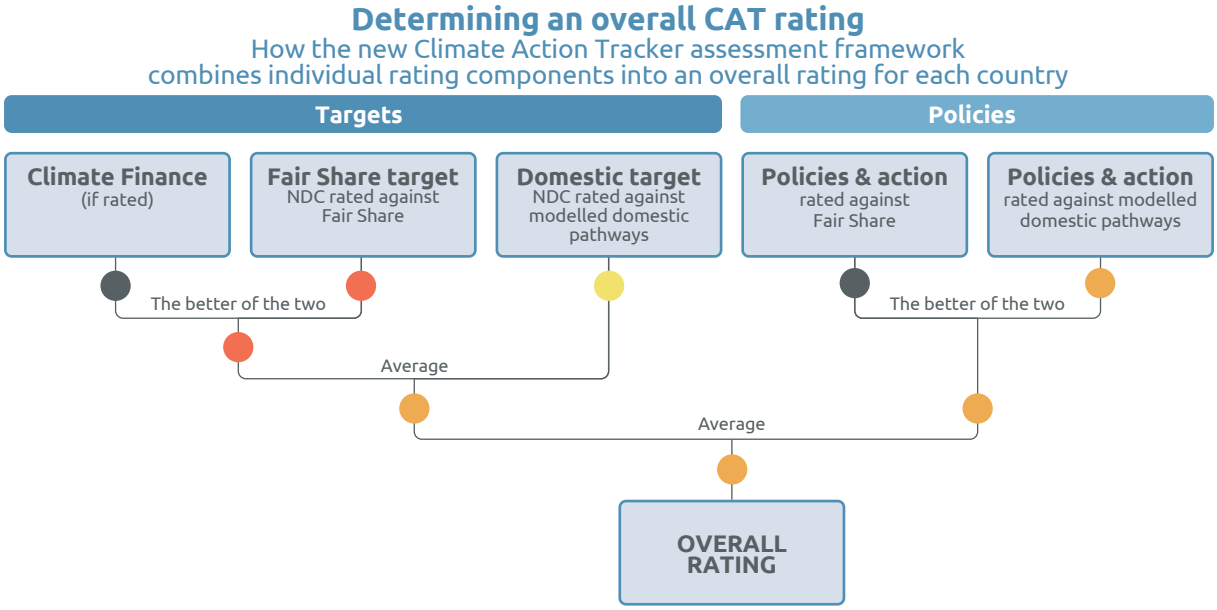

Figure 4: Method for determining the overall rating for a country.

1.6.2 What does it take for a country to get a "1.5°C Paris Agreement compatible" rating?

Countries whose fair-share rating means they need to be both ambitious at home and support others (usually developed countries) need to do just that. They need to:

- Set domestic targets consistent with at least the 1.5 global least cost pathways
- Implement policies that will meet those targets
- Work with other countries in achieving emissions reductions, either through bilateral agreements or through providing climate mitigation finance.

To achieve an overall 1.5°C Paris Agreement compatible rating, these governments need to achieve a Paris compatible rating on policies and action, domestic targets, and on international support.

Countries who will need support to fully decarbonise (usually developing countries) should:

- put forward targets that put them on track to full decarbonisation
- outline the support they need to meet those targets
- put in place the policies that make sense within their own resources

To achieve an overall 1.5°C Paris Agreement compatible rating, these countries need to do what they can using their own resources and make plans for what could be done additionally with support.

Some countries are in between the two categories, i.e., our method does not decisively determine if they should provide or receive support. In this case the two assessment frameworks (fair share and modelled domestic pathways) yield very similar results. These countries need to:

- put forward targets that put them on track to full decarbonisation
- put in place the policies that make sense within their own resources

1.7 Detailed methods and what you will find in this report

You've just read an overview of the key components of the CAT's rating methods, launched in 2021. In the sections below we describe in detail some of the details of those methods.

First, we look at the various different components of climate action that governments are responsible for – setting targets, implementing policies and action, and supporting other countries in decarbonisation (section 2).

Second, we describe the two main frameworks of assessment that we use to compare countries action – the modelled domestic pathways framework (section 3) and the fair share framework (section 4). An important component of reaching a fair share contribution is to also provide climate finance to support others to decarbonise (section 5).

2 What does the CAT evaluate?

2.1 Targets and promises

We rate countries targets – commonly their Nationally Determined Contributions under the Paris Agreement – against both reference frameworks described above. National targets for GHG reductions are an indication of the government's commitment to action against climate change. We rate targets because it's important to know if these declarations are sufficient, if met, to meet the Paris Agreement goal. Such information is vital for the Global Stocktake discussions under the UNFCCC to identify if, and by how much, NDCs need to be strengthened to achieve the Paris Agreement goal.

NDCs are not all the same and we rate different types and components of NDCs in a different manner. NDC targets are formulated in many ways – some state a reduction below an historic reference year or reference future scenario, others aim to reduce emissions intensities, while others focus on policies and measures.

How we quantify likely emissions under NDC targets is explained on the website. Important to note is that, as elsewhere in the CAT, we rate emissions targets under NDCs as emissions excl. LULUCF. Where the target excluding LULUCF is not clear in the NDC, we calculate likely emissions excl. LULUCF based on any information available in the NDC and other national sources indicating likely future LULUCF emissions.

What's important for our rating system is what is covered by the NDC, where emissions reductions will occur (i.e., domestically within a country's borders, or abroad), and whether the target is dependent on support from other countries.

Domestic and International components to NDCs

We distinguish between domestic and international NDCs for countries that should be achieving their emissions reductions using their own resources, i.e., not receiving support from others.

By "where emissions reductions occur" we refer to whether the target for emissions reductions is to be met within a country's own borders ("domestic") and using its own resources, or whether some of the emissions reductions will be achieved in other countries through international cooperation ("international"). Some governments have indicated that they plan to use the Article 6 mechanisms to achieve emissions reductions abroad; once the Article 6 rules have been agreed, these emissions reductions could be used towards what we term the "international" component of their NDC as long as the country that hosts the emissions reductions does not count the reductions towards its own NDC.

Countries with an "international" NDC element are generally developed countries whose 1.5 fair share contribution is more stringent than the 1.5 modelled domestic pathway. These countries will find it challenging to meet their 1.5 fair share target within their own borders and need to contribute to their fair share by also reducing emissions abroad. That can be done through their international NDC,

using Article 6, and / or through providing climate finance to support emissions reductions elsewhere. We assess the international NDC as a complete package and then assess climate finance separately (see section 5).

Climate mitigation finance should enable emissions reductions to be achieved elsewhere, but it is challenging to translate a given amount of climate finance into a quantitative emissions reduction amount. There are many reasons for this; the quality of climate finance is difficult to evaluate as a whole and varies between projects, climate finance may flow through various channels, such as multi-lateral development banks, making it difficult to trace the finance flows from the provider to the final impacts. Different types of climate finance also vary in their quality and reach. Even more difficult is to estimate the impact of climate finance on emissions reductions in the future. What is clear, is that substantial finance is needed and what has been provided to date is insufficient. We therefore assess climate finance separately, using a series of benchmarks to indicate the level of finance provided by different countries and to highlight what needs to be improved if countries are to use climate finance to make up their fair share. See Section 5 below.

An NDC may therefore have both a 'domestic' and 'international' component. We rate the domestic component against the modelled domestic pathways as the "domestic target" because this is what needs to happen for full decarbonisation within that country. We then rate the full NDC (domestic and international, if the NDC includes and international component) against their fair share – the 'fair share target' rating. This fair share target rating should be considered alongside the climate finance rating; we have kept these two ratings separate for the reasons listed above, but they are linked because a shortfall in the fair share target rating can be made up for, at least in part, by a strong climate finance rating.

Conditional and Unconditional NDCs

In contrast, some countries will need support to reduce emissions in line with the 1.5 modelled domestic pathway targets. It may be possible for these countries to achieve some emissions reductions under their own resources, and we encourage such countries to set an "unconditional" target, at least in line with their 1.5 fair share level. Actual emissions reductions should, also in countries with support needs, be in line with the 1.5°C modelled domestic pathways. If support is required to meet the 1.5 modelled domestic pathway level, these countries can set a "conditional" target that outlines the support they would need to decarbonise.

We therefore rate "unconditional" NDCs against the fair share framework and call this the 'fair share target' and conditional NDCs against modelled domestic pathways as the "internationally supported target" rating.

NDC components and their rating

Every country receives two target ratings – one against fair shares and one against modelled domestic pathways. Where possible, this follows the logic defined above. However, some countries don't have multiple types of NDC target, so we identify the most suitable component of the NDC to rate in each case.

Targets to be rated **against fair shares** are, in priority order:

- Full NDC, including any international component
- Unconditional NDC that is to be achieved within its own borders.
- Policies and action – some countries don't have an unconditional NDC, we therefore take policies and action as a representation of what that government will do under its own resources.

All of these are named the "fair share target" in our graphics and reports.

Targets to be rated **against modelled domestic pathways** are taken as follows:

- Conditional NDC – "internationally supported target"
- Domestic component of an unconditional NDC - "domestic target"

Some countries could improve their overall rating by also putting forward a "conditional target" that outlines support required. Others, whose fair share target is more stringent, should be putting forward more ambitious unconditional NDCs.

Some countries have not clarified whether their unconditional NDC is to be achieved through domestic actions only, or whether international cooperation might be used. We have assumed the target to be domestic in these cases but note that more clarity is needed.

Additional considerations

When establishing our rating of targets, a few other considerations are taken into account that only apply to a few specific countries.

- Some countries have not yet ratified the Paris Agreement. These countries have, however, put forward an "intended nationally determined contribution" (iNDC). We rate these iNDCs in the same manner as above, where relevant, and indicate that they are iNDCs in figures and text.
- We always rate the latest NDCs and, in some cases, also rate announcements of yet to be submitted NDCs where we judge that the announcement is reliable and unlikely to be retracted. If an announced NDC is rated, it's clearly indicated in the country text.
- Some countries present their NDC targets as a range, e.g., 40-42% below 2010. Where this is the case, we usually rate the end of the range that leads to the highest emissions level as that is the minimum commitment from the government. However, if the absolute emissions level resulting from the target is a range because of uncertainty in assumptions underlying the quantification, we use the mean of the upper and lower end of the range.
- We rate 2030 targets in the CAT rating. Most NDCs focus around 2030 and this near-term milestone is an important step toward full decarbonisation mid-century. Governments need to act now to ensure that 2030 targets are met. Some countries with different target years are rated on an estimated 2030 target that's consistent with their other targets.

2.2 Policies and action

When rating "policies and action", we mean the emissions projections under implemented action by governments, or current national policies. We consider as "current policies" those that are likely to have an effect on greenhouse gas emissions. Usually, they are *adopted* by the government and there are also signs that they are in the process of being *implemented*. These projections are an indication of a country's efforts on the ground and the effectiveness of action against climate change in the country.

Our methods for calculating emissions projections under current policies are described on the CAT website.

The quantification of emissions under policies and action usually results in a range that reflects the uncertainty in the effectiveness of policies and future developments, such as GDP growth. When rating policies and action we therefore generally use the middle of the range as the range represents real uncertainty.

In some cases, the range in policies and action reflects a range of scenarios that have different underlying data and assumptions and where one scenario is clearly more likely than the other. In these cases, we may take a specific scenario (e.g., the upper or lower bound) for the rating. Where we do so, we justify the approach in the country assessments.

When determining the policies and action *rating* for countries, we always use the framework (fair share or modelled domestic pathways) that yields the more favourable rating. We do this because it indicates what the country is doing at home under its own resources, and thereby within its own capacities.

Our policies and action emissions pathways are always evaluated domestically – within the countries own borders. Policies and action should be improved to get a country onto its 1.5 modelled domestic pathway. Some countries, mostly developed, will be able to do this under their own resources. Other countries, mostly developing, will need support to do so. While it's important to see if a developing countries' policies are sufficient to get to their 1.5 modelled domestic pathway, it would be unfair to rate them against this framework. Instead, we indicate where additional support would be needed.

3 Modelled domestic pathways

In 2021 the CAT introduced a new framework for evaluating government's targets and action – "modelled domestic pathways". We use the modelled domestic pathways to assess whether targets or policies are on track towards full decarbonisation in line with the 1.5°C warming limit. The modelled domestic pathways aim at providing feasible emission reduction pathways within each country, complementing the important focus on fair shares.

Most developing countries will need support to meet a 1.5°C modelled domestic pathway. This framework allows us to see where, and how much, support they are due. Conversely, developed countries should be achieving at least their 1.5°C modelled domestic pathway domestically and using their own resources.

In this section, we explain how the modelled domestic pathways are derived and some of the limitations of the data and methods we have available.

3.1 Modelled global pathways

]Scenarios of integrated assessment models (IAM) quantify storylines of future development of the coupled energy-land-economy-climate system and describe the anthropogenic emissions of greenhouse gases across sectors and regions over the twenty-first century. Between feasible transition pathways for a given set of technological, socio-economic and policy assumptions, these models select global least-cost solutions rather than an equitable distribution of burdens. Alongside the IPCC Special Report on 1.5°C (IPCC SR1.5) (Rogelj *et al.*, 2018) a consolidated scenario ensemble of 414 scenarios from 13 global models in five world regions that lead to warming impacts from 1.5°C to above 4°C has been published (Huppmann *et al.*, 2019).

Paris Agreement compatible pathways are defined as in the IPCC SR1.5 as those that limit warming to 1.5°C with no or limited overshoot (<0.1°C). In these pathways, the increase of global average temperature above its pre-industrial level is limited to below 1.6°C for the whole twenty-first century and below 1.5°C by 2100.

3.1.1 Discussion and limitations on global least-cost pathways

The scenarios considered were generated by Integrated Assessment Models, which are part of the IPCC Special report on 1.5°C, published in 2018. As there is a delay in the publication of emission and energy consumption data, often two to three years, the majority of the historical scenario data only goes up until 2015 or even earlier. Scenario data thus may differ from more recent historical data in the period between 2015 and the present. We address this issue with data harmonisation routines to match historical data.

Beyond possible discrepancies with recent historical data, care should be taken in the interpretation of global model results. While the global pathways provide useful guidance for an upper-limit of emissions trajectories for developed countries, they underestimate the feasible space for such countries to reach net zero earlier. The current generation of models tend to depend strongly on land-use sinks outside of currently developed countries and include fossil fuel use well beyond the time at which these could be phased out, compared to what is understood from bottom-up approaches.

The scientific teams which provide these global pathways constantly improve the technologies represented in their models – and novel carbon dioxide removal (CDR) technologies are now being included in new studies focused on deep mitigation scenarios meeting the Paris Agreement. A wide assessment database of these new scenarios is not yet available; thus, we rely on available scenarios which focus particularly on bioenergy with carbon capture and storage (BECCS) as a net-negative emission technology to offset so-called "hard to abate" sectors or to bring global temperature back down to a safer level.

The amount of CDR required depends on the pace of global progress in reducing emissions; early action to rapidly decarbonise and reduce the overall need for CDR are essential. While measures

to reduce emissions often come with co-benefits for society (for example, improved energy access, lower costs, cleaner air), the same is not true for many CDR options. If deployed at a larger scale, CDR technologies would entail negative side-effects across different dimensions of sustainable development objectives. Their technological and economic viability have not been proven yet and limited progress has been observed in planning and deploying them at national levels (Fyson *et al.*, 2020).

The IPCC SR1.5 finds limits for a sustainable use of both carbon dioxide removal options globally by 2050 to be below 5 $GtCO_2$ p.a. for bioenergy with carbon capture and sequestration (BECCS) and below 3.6 $GtCO_2$ p.a. for sequestration through afforestation and reforestation (AR) while noting uncertainty in the assessment of sustainable use and economic and technical potential in the latter half of the century (Fuss *et al.*, 2018; IPCC, 2018). Accordingly, we filter the used scenario ensemble and remove scenarios exceeding the BECCS limitation in 2050 or the AR limit as an average over the second half of the century, noting that forestry-related sequestration can exhibit interannual variability.

3.2 Deriving country-level pathways

Each scenario in the filtered scenario ensemble provides consistent greenhouse gas emissions pathways for the sectors Energy, Industrial Processes and Product Use, Agriculture and Waste from 2010 to 2100 for five world regions. The modelled domestic pathways are derived from these by

1. harmonising each scenario to historical sectoral emissions of the year 2015,
2. downscaling the emissions from the world regions to countries, and
3. summarising the downscaled total greenhouse gas emissions for each country with the median and a low percentile of the scenarios for the temperature categories.

The discrepancy of historical emissions in the scenarios from the official UNFCCC data inventory of national greenhouse gas emissions is addressed by harmonising the scenario data in each world region and sector to a consistent value in 2015 with Aneris the automated IAM harmonisation tool developed for the CMIP6 intercomparison project (Gidden *et al.*, 2018). The historical value in 2015 was derived by extending the UNFCCC data with PRIMAP-hist sectoral emissions and aggregating the country emissions to the world regions. For the dominant emissions of the Energy sector a total carbon budget preserving method was chosen instead.

For downscaling the emissions in the Energy, Industrial processes and Waste sectors from the world region to individual countries a methodology based on *intensity convergence* is used; more specifically the Impact, Population, Affluence, and Technology (IPAT) method as developed by van Vuuren *et al.*, (2007) and extended by Gidden *et al.*, (2019). It assumes that emissions intensities (i.e., the ratio of emissions to GDP) will converge from their values in the historical base year to the world region intensity in the last year of the scenario data, in the year 2100. This is made possible by an exponential interpolation of emission intensities from the base-year to the convergence year. Together with the yearly GDP by the given scenario, this interpolation defines how the emissions of the macro region are shared amongst the countries.

In most pathways, the Energy - CO_2 emissions become negative long before 2100. We move and scale the exponential convergence model to account for the shift from positive to negative emissions in the downscaling routine.

Since emissions in the Agriculture sector do not necessarily correlate with the GDP development, the emissions for individual countries are determined by assuming the emission shares of the countries in the base year (2015) remain constant over the whole scenario period, a simple downscaling methodology called “base-year pattern”.

After the emissions projections of each sector have been harmonised and downscaled to the individual countries, they are aggregated to consistent economy-wide emissions pathways for each scenario in the filtered scenario ensemble. We then assess the full distribution of the downscaled outcomes in temperature categories. The temperature categories are defined in the same manner as those used for the fair share framework – we group pathways that would lead to a 66% or greater chance of

holding warming below 2, 3, and 4°C. Pathways that would keep warming below 1.5°C with a 50% probability, and fit the sustainability criteria defined above, are labelled 1.5°C compatible.

Within each of these temperature categories, we determine the median (50th percentile) country-level emissions pathway as a representative for each country and use it as a threshold for the respective temperature category.

4 Fair share

4.1 Introduction

This element of the rating evaluates the level of effort of a government's target or policies against what could be considered a "fair share" contribution to the global effort in reducing greenhouse gas emissions.

Although there are no agreed guidelines on what would constitute a fair level of contribution to the global effort, beyond the general understanding of reflecting the "common but differentiated responsibilities and respective capabilities, in the light of different national circumstances" (Paris Agreement, Article 4.3), governments are expected to provide some justification of their proposed efforts.

The Paris Agreement envisages an iterative approach to updating and progressing NDCs, in which individual government efforts are to be regularly revised, informed by a regular global stocktaking process.

The Climate Action Tracker (CAT) provides a way of comparing targets and action with the many interpretations of what could be considered "fair." We hope that it helps governments, the media and observers to interpret the commitments of countries under the Paris Agreement.

The Climate Action Tracker's "fair share range" rating system is based on published scientific literature (see section 4.1.5) on what a country's total contribution would need to be to make a fair contribution to implementing the Paris agreement, supplemented by own analysis to close data gaps.

4.2 Summary of the method

Assessing what is fair depends on the viewpoint and interests of governments. Many consider it fair that those who have made a bigger contribution to the problem, or who have a higher capability to act, should do more.

In our assessment, we have compiled a wide range of literature on what different researchers from many perspectives would consider a "fair" contribution to greenhouse gas reductions: so-called effort sharing studies.

The effort-sharing studies in the CAT's database include over 40 studies used by the 5th Assessment Report of the IPCC (chapter 6 of WG III, Höhne *et al.*, (2013)), new studies that have been published since, and additional analyses the CAT has performed to complete the dataset. A full overview of the studies used is in the references list below. They cover very different viewpoints of what could be fair, including considerations of equity such as historical responsibility, capability, and equality. We take into account results from studies that are originally compatible with the former 2°C goal, as well as the 1.5°C limit in the Paris Agreement, to cover the full range of perspectives and historical developments of the long-term temperature goals.

We construct a "fair share range" for each country from the range of fairness estimates from the literature. We further use a weighting scheme to make sure that all equity viewpoints (categories) are considered equally. The fair share boundaries are chosen as the inner 90% of the study distribution. By doing so, we limit the influence of extreme studies while having the wide majority of studies included

in the fair share range. We then divide the "fair share range" into sections, or ratings, by taking the same level within that range for all countries. This allows to define the same level of ambition for all countries with regards to their individual fair share literature and determine fair emission allowances in the years 2025, 2030 and 2050.

Each possible level corresponds to the temperature outcomes that would result if all other governments were to put forward targets with the same relative position on their respective fair share range, i.e., the same ambition level.

Finally, the CAT identifies which levels of same ambition on the global range lead to global warming levels relevant for the Paris Agreement:

- Critically insufficient (as end-of-century warming above 4˚C)
- Highly Insufficient (as end-of-century warming below 4°C with a two-thirds chance)
- Insufficient (as end-of-century warming below 3°C with a two-thirds chance)
- 2°C compatible (as end-of-century warming below 2°C with a two-thirds chance)
- 1.5°C Paris Agreement compatible (warming limited to below 1.6°C over the 21st century, and below 1.5°C with two-thirds chance in 2100)

For example, if all governments were to put forward targets and policies at the top of their "Insufficient" range, warming would reach 3°C by the end of the century with a two-thirds chance.

An "Insufficient" rating therefore means that although the target could be considered fair by some approaches, it is not sufficient to hold warming below 2°C, much less 1.5°C, unless others do substantially more.

If all governments were to put forward targets within the "Almost sufficient" category, warming could be held below 2°C with a likely probability (66% or greater), but not "well below 2°C" or below 1.5°C.

If all governments put forward "1.5°C Paris Agreement compatible" NDCs, which is close to the most ambitious end of their "fair share range" (minimum fair emissions), warming would be held well below 2°C and limited to 1.5°C.

If all governments were to follow a "Highly insufficient" ambition level, warming would reach above 3°C and below 4°C.

If all governments were to follow a "Critically insufficient" ambition level, warming would exceed 4°C.

There are approaches that indicate a fair contribution of some countries would involve very steep reductions, in some cases going to less than zero by 2030. In cases where such stringent reductions could not be achieved domestically, the country would have to compensate what it cannot reduce within its own borders elsewhere, for example through providing climate finance to support emissions reductions in other countries.

The CAT rating of governments' NDCs and policies against their "fair share" contribution towards reducing emissions from fossil fuel combustion, industry, agriculture and waste sources—in effect on their contribution towards long-term decarbonisation—is excluding LULUCF. The reasoning behind this approach can be found here.

4.3 Taking all published sharing approaches into account

For each country and year, we show the ranges that result from seven specific effort sharing categories summarised in Figure 3, based on the definitions used in the 5th Assessment Report of the IPCC (chapter 6 of WG III). They cover a broad spectrum of views, but we acknowledge that some views are not quantified at this stage, such as intergenerational equity or analysis according to consumption-based emissions.

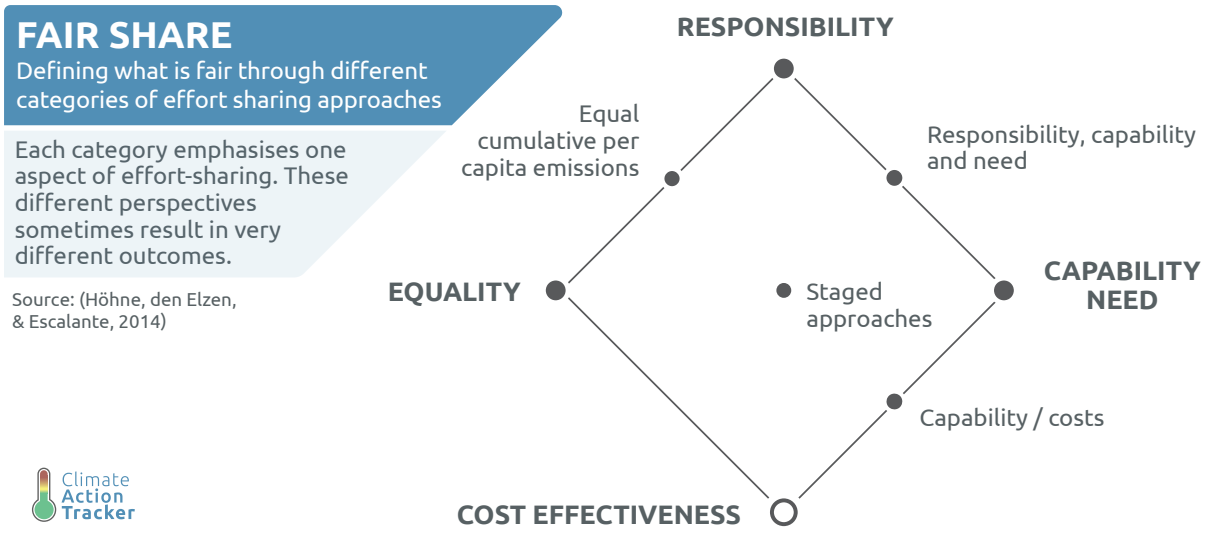

Figure 5: Categories of effort sharing approaches (Höhne, den Elzen, & Escalante, 2014).
Note: cost effectiveness is a concept included in the capability/costs category, but isn't a stand-alone category.

Each category puts an emphasis on one particular aspect of effort-sharing and can therefore result in (very) different outcomes from the other categories:

- Responsibility: emissions reductions below a reference are determined by the level of a country's historical emissions. This was first proposed by Brazil in the Kyoto Protocol negotiations.
- Capability/Need: emissions reductions below a reference are determined by a country's level of economic capability, often measured by GDP/capita or the Human Development Index.
- Equality: emissions per capita converge to, or immediately reach, the same level for all countries
- Equal cumulative per capita emissions: emissions need to be reduced so that cumulative emissions per capita reach the same level
- Responsibility/capability/need: a range of studies have explicitly used responsibility and capability and the right to development as the basis for distributing emissions reductions
- Capability/cost: a range of studies use equal costs or welfare loss per GDP as a basis. This is essentially a combination of mitigation potential and capability
- Staged: a suite of studies have proposed, or have analysed, approaches where countries take differentiated commitments in various stages. Categorisation to a staged group and the respective commitments are determined by indicators using many equity principles

The "fair share range" of a country is determined by "walking" (or moving along) the distribution. The distribution is constructed such that each category (not each data point) has equal weight (Figure 6). After weighting each category equally, we start walking the datapoints from the maximum and the minimum to the middle until we have covered 5% of the weighted distribution – this point determines the lower end of the fair share range (red dotted lines in Figure 6). We then keep walking until we have covered 95% of the weighted distribution – this point determines the top end of the fair share range. In this example, the fair share range is substantially smaller than the full range of all results, as some individual studies are substantially higher or lower than the rest of the dataset, but still included 90% of the weighted studies.

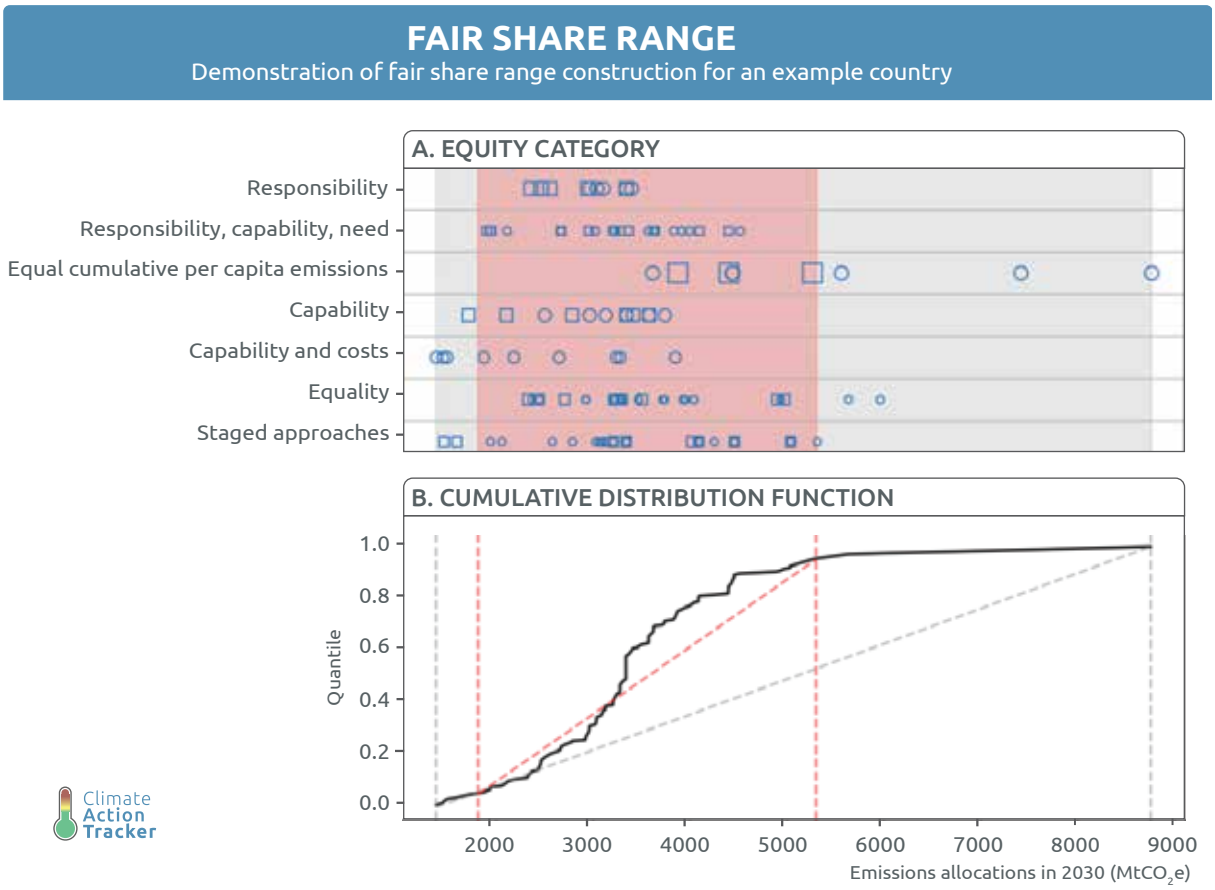

Figure 6: Demonstration of fair share range construction for an example country. Literature-based estimates for fair emission allowances are shown according to their equity category (a). Squares indicate studies related to 1.5C warming, while circles depict 2C studies. The symbol size reflects the weighting of studies that enforces that all studies in one category sum up to the same value. The lower panel (b) depicts the Cumulative Distribution Function (CDF) according to the same weighting as the black line. The dotted red and grey lines depict CDF of uniform distributions between the fifth and the 95th percentile and respectively the minimum and maximum.

4.4 More information and general changes compared to previous fair share rating approach

CAT updated its rating method in September 2021, including methodological updates to the fair share ranges for each country. The new update of the fair share methodology included the following major improvements:

- The latest equity studies from the literature have been included in our fair share rating assessment. We have also removed outdated studies, for example where a more recent study from the same authors is available.
- Equity studies in the literature are quite diverse, and differ heavily in the underlying assumptions, and the CAT aims to include as many studies as possible. However, to ensure the quality of the results, we filtered out selected equity studies with an incompatible sectoral scope (e.g., energy sector emissions only) or gas coverage (e.g., CO_2 emissions only). This ensures that the CAT fair share ranges represent the literature on a comparable scope.
- Fair share allocations quantified directly by CAT were updated to the latest available baseline scenarios (SSP2 RCP85) and the latest sustainable 1.5°C-compatible global scenarios.
- The definition of the fair share range has changed to limit the possible influence of a small number of extreme studies. The new data set is weighted in a way that different types of equity approaches contribute similarly to the overall fair share range. The range is defined as the inner 90% (excluding 5% on each extreme) of studies in the weighted data set.

- Finally, we adapted the temperature categories for 2°C, 3°C and 4°C so that the projected global warming is likely (66% change) to be below those levels. This is now more consistent with other components of the CAT, such as our global temperature ratings. In the old rating methodology, all temperature levels were computed for a 50% chance to be below. The 1.5°C temperature level is remains defined as a 50% change to be below this level in 2100 since this is closely consistent with definitions in the IPCC Special Report of 1.5°C.

A description of the previous rating method is available here. A description of the main implications of the rating method change including country-specific information is available here. In 2017, CAT had also updated its fair share method. For further information on how the 2017 methodology update affects our rating system click here.

4.5 Literature used as input

We used the following literature to determine the fair share contribution:

Table 1: List of literature for the fair share contribution

Reference	Title	Included in Curated Dataset?	Reason for exclusion
(M. den Elzen *et al.*, 2013)	Reduction targets and abatement costs of developing countries resulting from global and developed countries' reduction targets by 2050.	Yes	
(Van Vuuren *et al.*, 2010)	Low stabilisation scenarios and implications for major world regions from an integrated assessment perspective.	Yes	
(Hof & den Elzen, 2010)	The effect of different historical emissions datasets on emission targets of the sectoral mitigation approach Triptych.	Yes	
(Knopf *et al.*, 2009)	The economics of low stabilisation: implications for technological change and policy	No	Based on energy-CO2 only
(M. den Elzen, Lucas, *et al.*, 2008)	Regional abatement action and costs under allocation schemes for emission allowances for achieving low CO2-equivalent concentrations.	No	Emissions in 2050 target pathway are too high
(M. den Elzen, Höhne, *et al.*, 2008)	The Triptych approach revisited – A staged sectoral approach for climate mitigation	Yes	
(van Vuuren *et al.*, 2009)	Comparison of different climate regimes: the impact of broadening participation.	Yes	
(M. G. J. den Elzen *et al.*, 2007)	Differentiation of countries' future commitments in a post-2010 climate regime: An assessment of the "South-North Dialogue" Proposal.	Partial	Included 450 ppm scenario only
(M. den Elzen & Meinshausen, 2006)	Meeting the EU 2°C climate target: global and regional emission implications.	Yes	
(M. den Elzen *et al.*, 2005)	Abatement costs of post-Kyoto climate regimes.	No	Baseline only
(Criqui *et al.*, 2003)	Greenhouse gas reduction pathways in the UNFCCC Process up to 2025.	No	Baseline only
(Berk & den Elzen, 2001)	Options for differentiation of future commitments in climate policy: how to realise timely participation to meet stringent climate goals?	No	Baseline only
(Kuntsi-Reunanen & Luukkanen, 2006)	Greenhouse gas emission reductions in the post-Kyoto period: Emission intensity changes required under the "contraction and convergence" approach.	No	Emissions in 2050 target pathway are too high

Reference	Title	Included in Curated Dataset?	Reason for exclusion
(Winkler *et al.*, 2013)	Equitable access to sustainable development: operationalising key criteria.	No	Emission reductions through to 2050 based on index and baseline reference from 2000 data
(Chakravarty *et al.*, 2009)	Sharing global CO2 emission reductions among one billion high emitters.	Yes	
(Bows & Anderson, 2008)	Contraction and convergence: an assessment of the CC options model.	Yes	
(Vaillancourt & Waaub, 2004)	Equity in international greenhouse gases abatement scenarios: A multicriteria approach.	No	Emissions in 2050 target pathway are too high
(Miketa & Schrattenholzer, 2006)	Equity implications of two burden sharing rules for stabilizing greenhouse gas concentrations.	No	Emissions in 2050 target pathway are too high
(Bode, 2004)	Equal emissions per capita over time – A proposal to combine responsibility and equity of rights for post-2012 GHG emission entitlement allocation.	No	Emissions in 2050 target pathway are too high
(Böhringer & Welsch, 2006)	Burden sharing in a greenhouse: Egalitarianism and sovereignty reconciled.	No	Baseline only
(Groenenberg *et al.*, 2004)	Global Triptych: a bottom-up approach for the differentiation of commitments under the Climate Convention.	No	Emissions in 2050 target pathway are too high
(WBGU, 2009)	Solving the climate dilemma: The budget approach.	Yes	
(Knopf *et al.*, 2012)	A global carbon market and the allocation of emission rights.	No	Based on energy-CO2 only
(Nabel *et al.*, 2011)	Decision support for international climate policy – The PRIMAP emission module.	Yes	
(Peterson & Klepper, 2007)	Distribution Matters – Taxes vs. Emissions Trading in Post Kyoto Climate Regimes.	No	Baseline only
(Onigkeit *et al.*, 2009)	Fairness aspects of linking the European emissions trading scheme under a long-term stabilization scenario for CO2 concentration.	Yes	
(Jacoby *et al.*, 2008)	Sharing the burden of GHG reductions.	Yes	
(Ottmar Edenhofer *et al.*, 2010)	The economics of low stabilization: Model comparison of mitigation strategies and costs.	No	Based on energy-CO2 only
(Höhne & Moltmann, 2009)	Sharing the effort under a global carbon budget.	Yes	
(Höhne & Moltmann, 2008)	Distribution of emission allowances under the Greenhouse Development Rights and other effort-sharing approaches.	Yes	
(Jayaraman *et al.*, 2011)	Equitable access to sustainable development: An Indian Approach	Yes	
(Kriegel *et al.*, 2014)	Can we still meet 2°C with global climate action? The LIMITS study on implications of Durban Action Platform scenarios.	Partial	Include C&C only
(Kober *et al.*, 2012)	The role of burden sharing regimes to reach the global 2°C climate target TIAM-ECN model approach Cost optimal GHG mitigation to reach the global 2°C climate target.	No	Data issues
(Baer *et al.*, 2008)	The Greenhouse Development Rights framework. The right to development in a climate constrained world.	Yes	
(Pan *et al.*, 2013)	Sharing emission space at an equitable basis: Allocation scheme based on the equal cumulative emission per capita principle.	No	Superseded by (Pan *et al.*, 2017)

Reference	Title	Included in Curated Dataset?	Reason for exclusion
EVOC tool (Moltmann *et al.*, 2011)	Tool developed to quantify multiple effort-sharing schemes, including contraction and convergence, common bud differentiated convergence, GDR, and multi-stage approaches.	Yes	
(Robiou du Pont *et al.*, 2017)	Equitable mitigation to achieve the Paris Agreement goals	Yes	
(Pan *et al.*, 2017)	Exploring fair and ambitious mitigation contributions under the Paris Agreement goals.	Yes	
(Holz *et al.*, 2017)	Fairly sharing 1.5: national fair shares of a 1.5°C compliant global mitigation effort.	Yes	
(van den Berg *et al.*, 2019)	Implications of various effort-sharing approaches for national carbon budgets and emission pathways.	Yes	

5 Finance

To fully incorporate fair shares into the new Climate Action Tracker (CAT) rating we require an assessment of international climate finance. Countries are expected to either meet their fair-share obligations through a combination of domestic mitigation, mitigation abroad and financial support for emissions reductions in other countries, or to receive financial support to mitigate emissions beyond what would be required by effort-sharing frameworks. Some countries, whose effort-sharing and modelled domestic pathways are very similar, would be expected to give or receive minimal support.

The CAT's fair-share levels and modelled domestic pathways provide a guide as to what is needed or expected from each country in terms of domestic mitigation and overseas action and support. A country could choose to go beyond its 1.5°C modelled domestic pathway and would thereby reduce the total finance it would be expected to provide.

Countries' climate finance commitments are evaluated differently depending on whether they are expected to give or receive financial support. Those expected to give support are evaluated based on the transparency and adequacy of that support. Those expecting to receive support are encouraged to develop plans to use potential financial support in an effective manner. Initially, the CAT only provides a rating of those countries that are expected to provide support.

Some countries intend to achieve emissions reductions both domestically and through international cooperation, including through Article 6 mechanisms (see section 2.1). In addition to those commitments, countries should also advance on their efforts to align domestic finance with the goals of the Paris Agreement (Article 2.1). The CAT's assessment of those activities will be discussed elsewhere, and we focus here only on international climate finance. For a clarification note on the scope please see Box 1.

Important note on the CAT's finance rating scope

The CAT quantifies and evaluates national climate change mitigation commitments, and assesses, whether countries are on track to meeting those.

The finance component of the CAT rating is focused on mitigation, in line with our overall method, which does not evaluate progress on other elements of the Paris Agreement, such as climate change adaptation, loss and damage, or progress related to non-state and subnational actors. The CAT also expects countries to meet their adaption support obligations and mobilise non-state and subnational action, but a direct evaluation of these remains outside our scope.

The CAT recognises the importance of assessing needs and finance provided for adaptation and loss and damage. We support the call for an increase in adaptation finance in the post-2020 period, especially considering its priority to LDCs and other developing countries (Carty *et al.*, 2020). Although we do not track progress on adaptation finance, we assume that half of the committed finance should support adaptation projects (UNFCCC, 2021).

While both the Convention and the Paris Agreement state that mobilised private finance should be considered climate finance, the CAT focuses on public finance. We exclude private finance due to methodological inexactness regarding quasi-public entities, lack of project-level, transparent data, and the overall limitations on measurements of mobilised finance (Bhattacharya *et al.*, 2020). The private finance included in the data sources used in our analysis is also negligible and often falls outside the CAT operationalisation of international climate finance contributions (more details in Section 5.2.1). Finally, the CAT tracks actions and targets from government, and attributing mobilised finance to government actions is difficult.

5.1 Climate finance definitions and concepts

The CAT evaluates countries' 2030 emissions reduction targets, presented in their NDCs, against a fair share framework. The fair share obligations for many developed countries require deep and rapid reductions in the coming decade, and in most cases substantially more reductions than what would be consistent with a modelled domestic pathway. Meeting such obligations through domestic emissions reductions alone would often be implausible. To bridge the gap between their domestic and fair share obligations, developed countries can support mitigation efforts abroad, through international climate finance. Other approaches include trading of mitigation obligations under the yet to be established Article 6 mechanism.

The CAT evaluates developed countries' financial contributions to assess their sufficiency. The CAT rating should incentivise donor countries to increase the transparency, volume, and predictability of their international climate mitigation-related finance contributions.

We set the expectation that developed countries should provide financial support sufficient to enable more expensive and challenging emissions reduction actions. Mitigation costs vary across sectors and countries and change over time, with costs likely to increase as emissions get closer to zero. Developed countries should support emissions reduction actions that are additional to what developing countries can achieve unilaterally. Some developing countries will need support for most of the emissions reductions that are needed. Others will need support only for the more challenging and expensive emissions reductions.

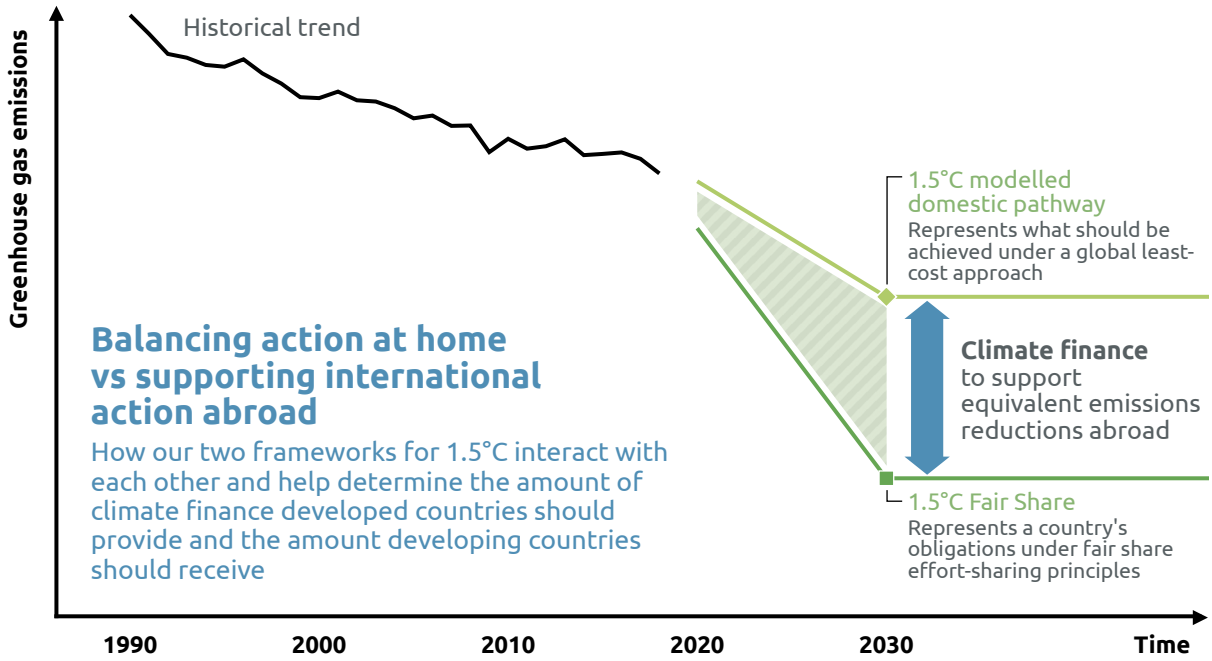

Figure 7: Countries can increase their international finance contributions to close the gap between domestic mitigation and their fair-share emissions.

5.1.1 How do we define climate finance?

The lack of consistent and reliable data on climate finance remains one of the biggest challenges to track international climate finance (Roberts *et al.*, 2021). Different interpretations of what constitutes adequate climate finance exist.

Our main data source to consider financial contributions from developed countries is the DAC database from the OECD. The DAC database contains project-level information about international climate-related development finance. It contains both bilateral and multi-lateral commitments and disbursements. In the calculation of this metric, we use the mitigation-related finance contributions only.

The database provides details on finance instruments, sectors and climate component. This enables treatment to the data to account for distinct interpretations of climate finance. For more information on the data used and further considerations, please see Section 5.4.1.

Changes in the DAC database aim to minimise inappropriate consideration of development finance as climate finance and of any finance that supports fossil fuels. The CAT removes:

- all private finance
- all financial contributions supporting fossil fuels (oil, gas and coal)
- all financial contributions where climate is not considered a principal component. This classification is based on the Rio Markers. To have a 'principal' component means that the activity explicitly aims to achieve a mitigation or adaptation goal – i.e., activities for which climate is not the fundamental driver or motivation are excluded.

To reflect data uncertainties and disagreement on definitions of climate finance we provide a range for each country that covers different interpretations of climate finance and rate countries using the middle of that range. This range accounts for the financial instruments used (e.g., loans or grants) and level of concessionality.

The maximum of the range is defined using a less stringent climate finance definition, that still respects the filters defined above. The maximum of the range includes all concessional finance. Concessional finance usually has lower interest rates or longer grace periods (*Development Co-Operation Report 2011*, 2011). Loans with high interest rates are, therefore, excluded.

The minimum of the range is defined using a more stringent interpretation of climate finance. It only includes non-debt instruments: grants and debt relief. This is an attempt to exclude any contributions that might further indebt developing countries.

For many countries, particularly those with low overall climate finance contributions, the range is very narrow, and the different definitions do not strongly impact their overall evaluation. However, some other countries, for example Germany and Japan, receive substantially different evaluations depending on the interpretation used since much of their support is provided through loans.

5.1.2 Which countries do we rate on finance provided?

Under our current assessment of climate mitigation finance, we rate developed countries only. By *developed* countries we mean those that are listed in Annex I of the UNFCCC Convention. Under the Convention, all Annex II Parties (a subset of Annex I Parties) are expected to provide support to *developing* countries to enhance their implementation of policies and plans. The Paris Agreement broadens this expectation to more Parties.

According to the Convention (Article 4.5):

> "The developed country Parties [Annex I] and other developed Parties included in Annex II shall take all practicable steps to promote, facilitate and finance, as appropriate, the transfer of, or access to, environmentally sound technologies and know-how to other Parties, particularly developing country Parties, to enable them to implement the provisions of the Convention."

And according to the Paris Agreement (Article 9.1):

> "Developed country Parties shall provide financial resources to assist developing country Parties with respect to both mitigation and adaptation in continuation of their existing

> obligations under the Convention."

The CAT rates international mitigation climate finance for all Annex I countries. We are unable to provide a full rating for Turkey or the Ukraine due to the lack of detailed international climate finance data that is consistent with data for other Annex I countries.

Who can, or should, provide climate finance is a complicated question. Some cases are more straightforward. For example, Annex I countries should in most cases clearly be providing finance. Other countries clearly need financial support to implement climate policies, such as those belonging to the group of Least Developed Countries (LDCs). For other countries, the situation is not always so clear.

Our two frameworks of fair shares and modelled domestic pathways provide one means of determining who could provide finance to others. A country's fair share emissions allocation defines allowed emissions for that country that, when applied within a global system, would ensure that we collectively meet the 1.5°C temperature limit in a fair manner. A country's 1.5°C modelled domestic pathway indicates what would be a globally cost-effective and technologically feasible manner of reaching the Paris goal.

Countries whose fair share is more stringent than the modelled domestic pathway can be expected to meet their modelled domestic pathway within their own borders and provide climate finance to support others in reducing emissions as a further contribution to their fair share. Most Annex I countries are in this situation.

Most developing countries are in the reverse situation – reaching their 1.5°C modelled pathway would require them to go well beyond their fair share and they therefore need support to do so.

The two frameworks also highlight some non-Annex I countries who, from a fair share perspective, could be expected to provide support – such as Korea, or Singapore. On the other hand, there are some countries who, under our framework, could be justified to ask for support but are already providing support to others (e.g., China). In most of these cases, the 1.5°C trajectories under the two frameworks are relatively close to each other. Although the trajectories are quite specific, there is some flexibility and uncertainty. For example, the modelled domestic pathways are derived from IAMs that may not capture all possible emissions reductions opportunities, particularly in developed countries (see section 3).

Our methods are not able to consider all specific national circumstances. A country may choose to, for example, go beyond its modelled pathway domestically to meet its fair share, rather than providing climate mitigation finance (Bauer *et al.*, 2020). Another situation may be that a country is in a position where it both needs some climate finance *and* can provide climate finance toward collectively meeting the Paris goal. Finally, there is at least one country (Argentina) for whom the fair share assessment does not adequately consider current economic circumstances, that show that the country is not in a position to provide climate finance to others.

Because of these different and complex situations, we have a group of countries that are not yet assessed in terms of their climate mitigation finance, but we hope to be able to provide a more nuanced analysis in the future. These countries are separated from those who should clearly either be providing or are eligible to receive finance support.

Table 2: Typology of countries with respect to international finance (includes all countries analysed by the CAT

CAT countries assessed for finance	CAT countries not assessed for climate finance[1]	CAT countries where current rating approach is not applicable
Australia	Argentina	Bhutan
Canada	China	Brazil
European Union (EU)	Chile	Colombia[3]
Germany	Iran[3]	Costa Rica
Japan	Korea	Ethiopia
New Zealand	Mexico	India
Norway	Singapore	Indonesia
Russia	Saudi Arabia	Kazakhstan
Switzerland	South Africa	Kenya
United Kingdom	Turkey[2]	Morocco
United States (USA)	Ukraine[2]	Nepal
	United Arab Emirates	Nigeria[3]
		Peru
		Thailand[3]
		The Gambia
		The Philippines
		Viet Nam

[1] Some of these countries will be rated in the future.
[2] Countries assessed but no rating possible.
[3] New CAT country for which we do not yet have a full assessment.

5.2 Finance rating method

A multi-criteria approach is used to identify key aspects of climate finance that, if adhered to, would advance the quality of international climate finance contributions. This approach speaks to specific components of climate mitigation finance and allow us to set expectations for improvement. Each component receives a rating ranging from 'Highly insufficient' to 'Good'. These ratings are combined to give an overall finance rating (Section 5.3).

Evaluating the adequacy of international contributions at the country level poses many challenges. First, determining the absolute total level of finance needed is difficult. Second, currently available climate finance data sources are not consistently reported and do not provide sufficient details on the type of finance provided to assess its quality. Third, an assessment of the effect of the contributions, e.g., in terms of emissions reductions, is unavailable. The CAT assesses several components that do not define sufficiency but do identify good practice to rate countries' international contributions.

The four components are:

- **Current contributions:** measures the level of international climate finance provided since Paris and compares it to a benchmark associated with the country's fair share. This is the most significant component of the CAT climate finance rating since it considers the absolute amount of finance provided for mitigation. This component does not account for the effectiveness of the finance provided.
- **Contributions' trend:** measures whether international climate finance provided has increased in the last five years. Overall climate finance needs to be scaled up, and this component measures if countries' financial contributions develop in the right direction. However, this component does not compare the country's trend against a 'good practice' benchmark for the rate of increase.
- **Future commitments:** evaluates countries' future commitments and pledges, if any exist, in terms of their transparency and reliability. The previous components looked at past contributions while this component rates countries' future commitments. It captures more recent developments that are still not reflected in the country's realised contributions. It also captures intentions to scale up climate finance. This component is important but represents a smaller share of the CAT finance overall rating. Once these commitments are realised, they will be reflected in the current contributions component.
- **Fossil finance overseas:** investigates whether countries provide support for fossil fuels abroad. Fossil fuel finance clearly undermines international climate finance efforts. The construction of coal-fired power plants or support for the development of fossil fuel extraction is at odds with the goals of the Paris Agreement.

The first component has the highest influence in the overall CAT finance rating, the others are included to qualify the overall contributions and to account for trends, announcements and the contradicting support for fossil finance. For more details on how these four components are combined into one rating, please see Section 5.3. In the following sections we present more information for each component.

5.2.1 Current contributions

CURRENT CONTRIBUTIONS
Q1: How do current international finance contributions compare to distinct benchmarks?

CRITICALLY INSUFFICIENT	Country has not provided international climate finance according to the CAT's criteria
HIGHLY INSUFFICIENT	Contributions are below a threshold based on the USD 100 billion commitment
INSUFFICIENT	Contributions are below a threshold based on doubling the USD 100 billion commitment
NEARLY SUFFICIENT	Contributions are above a threshold based on the USD 100 billion commitment
GOOD	Contributions are well above a threshold based on the USD 100 billion commitment and in line with least-cost global mitigation

In this component, we aim to measure the overall level of climate finance contributions. To answer question Q1, the CAT uses information about a country's climate finance contributions (Section 5.1.1) and its additional mitigation obligation (see below) to create a comparable indicator of international finance support.

Measuring and distributing the additional mitigation obligation

The additional mitigation obligation for each country is calculated as the cumulative difference between the country's fair-share emissions for a 1.5°C pathway and domestic emissions under a global least-cost 1.5°C pathway between 2017 (the starting point of our fair share pathways) and 2030; this is illustrated by the hatched area between the curves in Figure 7. These pathways are the same as those used to assess targets and policies (see section 2).

The difference in emissions between fair-share and modelled pathways is calculated for all CAT countries but here we focus on countries that are expected to provide climate finance. The gap between fair-share and modelled domestic pathways in 2030 is approximately 5 $GtCO_2e$, and over the whole decade comes to around 30 $GtCO_2e$. We expect developed countries to fill this gap through support internationally.

A country whose fair-share obligation greatly exceeds their least-cost 1.5°C consistent pathway is expected to provide more finance than one whose least-cost and fair-share pathways are more similar. Error! Reference source not found. below shows how the finance obligation, calculated in this way, is distributed between CAT countries. The EU, UK, Switzerland and Norway have comparatively stringent fair-share targets due to their relatively high historic responsibility and/or GDP. Their fair-share targets translate into a higher share of the finance obligations as compared to their current emissions.

Table 3: Additional fair share obligation. Shares of total climate mitigation finance that each developed country is responsible for, according to the cumulative difference between their 1.5 compatible fair share and modelled domestic pathways between 2017 and 2030.

Country	Additional fair-share obligation as % of CAT developed country total
Australia	1.5%
Canada	2.8%
European Union	29.9%
Germany	9.7%
Japan	4.8%
Korea	0.4%
New Zealand	0.7%
Norway	7.8%
Russia	1.0%
Switzerland	7.9%
United Kingdom	43.2%
Ukraine	0%
Turkey	-2%
USA	36%

Comparing climate finance provided with fair-share obligations

Our metric for comparing international climate finance support between countries is calculated by dividing a countries' annual financial contributions since the Paris Agreement (between 2016 and 2019) by the average additional mitigation obligation described above (Figure 7). This indicator is referred to throughout this document as 'contribution per mitigation obligation', which is a unit of USD per tonne of CO_2e.

Given reporting timelines, the most recent finance data available is generally two years in the past (for example, in 2022 we will be able to assess 2020 contributions). This means that we will always be assessing historical finance contributions and comparing these with what is needed over the period to 2030. Because of the lag between providing finance and seeing results in terms of emissions reductions, and the knock-on effects that actions can have for accelerating future emissions reductions, it is justifiable to compare recent finance contributions with the mitigation obligations needed over the decade. We look at future finance commitments under question Q3 (Section 5.2.3).

Defining benchmarks for the 'contribution per mitigation obligation'

The 'contribution per mitigation obligation' is the key metric to assess the absolute amount of finance provided. Rather than show a single level of sufficiency, we indicate what different levels would mean in terms of existing commitments. Evaluating the total amount of global climate mitigation finance required is extremely challenging. However, there are lines of evidence that we can combine to indicate the adequacy of finance provided to date.

In 2009, the global community agreed to provide USD 100 billion / year in total climate finance by 2020 and several developed countries have committed to extend this commitment to 2025.

To set a threshold based on the USD 100 billion helps to hold developed countries accountable to meet their own agreed targets. However, several factors must be considered.

First, the definition of finance included in the USD 100 billion is not so clearly agreed. We have chosen a moderately stringent definition of climate finance to assess – no private finance, climate-specific mitigation finance only, and partial inclusion of loans (Section 5.1.1). We want to compare 'like with like' and so set reasonable but ambitious expectations for public, mitigation climate finance.

Second, the UN Secretary António Guterrez called for a parity in climate finance between mitigation and adaptation, which is already operationalised in some climate funds and broadly supported by other relevant stakeholder groups (Trujillo *et al.*, 2015; UNFCCC, 2021). Based on this, we consider a baseline requirement for mitigation finance that is half of the USD 100 billion, assuming that the other half should be adaptation finance.

Third, the USD 100 billion can be considered insufficient in itself and can therefore be treated as a lower bound on what to expect from countries (Bhattacharya *et al.*, 2020). A country meeting their share of the USD 100 billion is therefore acknowledged for doing better than other countries, but not awarded a 'good' rating. This threshold should either be seen as a minimum contribution going forward or could be progressively raised in line with future joint commitments from developed countries.

In the future, as we continue to assess finance provided in later years, the thresholds will be updated to reflect:

- Rates of increase in GDP
- Any new multilateral agreements on provision of finance
- Measures reflecting the increasing needs for finance to implement change. That increase will be informed by the latest science, including the IPCC.

Our thresholds for the 2021 rating are outlined in Table 4.

Table 4: Overview of thresholds for 'contribution ratio' finance assessment.

Rating category	$ amounts	Reasoning	Explanation and meaning
Critically Insufficient	No finance provided		Indicates no action where there should be
Highly Insufficient	**Up to 17** USD / tCO2e	Lowest threshold linked to the mitigation component of the 100 billion	Countries need to at least provide the level of finance they have agreed to
Insufficient	**17 – 33** USD / tCO2e	Approaching doubling of agreed efforts	Still insufficient but stands out from others
Nearly sufficient	**33 – 67** USD / tCO2e	More than double the USD 100 billion level and in line with global least cost pathways (Bauer *et al.*, 2020)	Reflects a high bar for pre-2020 finance
Good	**More than 67** USD / tCO2e	Consistent with a strong investment in challenging mitigation options	Clear leader

5.2.2 Contributions' trend

CONTRIBUTIONS' TREND
Q2: Has international support for climate mitigation increased or decreased in the past years?

HIGHLY INSUFFICIENT	Contributions clearly decreased over time
INSUFFICIENT	Contributions show no clear trend
GOOD	Contributions clearly increased over time

Overall climate finance needs to be scaled up. This component measures if countries' financial contributions have developed in the right direction in the past years. To answer question Q2, we evaluate international finance contributions over time based on the modified DAC database (same as Q1). We assess the trend using a 3-year moving average over the last five years of data.

The moving average is used to smooth the trend to account for the fact that commitments might not be homogeneously distributed over the years. We use five years to calculate the trend since there is limited data availability to assess the trends since Paris. Additionally, using a fixed window allows the use of a consistent and comparable method to be used to evaluate the trends once data for later years becomes available.

5.2.3 Future commitments

FUTURE COMMITMENTS **Q3:** Has the country committed to further support in the future?	
HIGHLY INSUFFICIENT	Country has not committed to future support
INSUFFICIENT	Country has committed to future support but did not announce an increase in climate finance
NEARLY SUFFICIENT	Country has committed to future support with a clear signal to increase climate finance
GOOD	Country has a binding and transparent commitment to increase climate finance

This component rates countries' future commitments. It captures more recent developments, that are still not reflected in the country's realised contributions. It also captures intentions to scale up climate finance.

To answer question Q3, we track announcements and commitments made by countries. Ideally, commitments follow at least some of the principles for adequate fund mobilisation, such as being new and additional, adequate and precautionary and predictable (Schalatek & Bird, 2015). Submissions to the UNFCCC in the context of Article 9.5 of the Paris Agreement are important information sources. The CAT additionally looks for:

- Political announcements
- Official government statements
- Statements on continuous, future contributions to climate funds
- Bilateral agreements
- International climate finance strategies, including information in UNFCCC submissions

A **binding commitment** indicates that the country has ensured it will provide a reliable source of international climate finance over time. If the commitment is defined in the national budget, it is undoubtedly considered a binding commitment. However, in several cases the commitments are presented through other means.

They can be, for example, a formal statement issued by the government, legislation that enshrines contributions to international climate finance, or pledges to climate funds. The CAT uses expert judgment to define whether the commitment is sufficiently binding. The justification for the choice is presented in the country assessment page. Political announcements, especially those as part of coalitions, are reviewed but not considered binding commitments.

A **transparent commitment** clearly indicates the level of the commitment. The country transparently shows the level of finance it will provide and how these contributions will take place. The country ideally also communicates financial instruments, finance destination and focus project types.

If, and how much, the level of commitment is an improvement on previous commitments is also important. As many commitments are not given for the same definition of finance as we use (e.g., also include adaptation finance) it is difficult to make a one-to-one comparison. However, we indicate whether future commitments reflect overall commitment to international climate finance and give an indication of whether these would be sufficient to improve the country's rating in Q1.

5.2.4 Fossil finance overseas

FOSSIL FINANCE OVERSEAS **Q4:** Has the country ended or does it have a commitment to end provision of public finance for fossil fuels internationally?	
HIGHLY INSUFFICIENT	Country has not committed to stop fossil fuel finance and still invests in fossil fuels abroad
INSUFFICIENT	Country has made a commitment to stop fossil fuel finance but still invests in fossil fuels abroad
OKAY	Country has stopped funding fossil fuels abroad but has not made an explicit commitment
GOOD	Country has committed to and stopped funding fossil fuels abroad

Fossil fuel finance clearly undermines international climate finance efforts. The construction of coal-fired power plants or support for the development of fossil fuel extraction is at odds with the collective goals of the Paris Agreement. To answer question Q4, we track announcements and commitments made by countries to stop fossil fuel finance. We also research for country-specific developments to identify recent finance for fossil fuels abroad. This includes finance for coal, oil, or gas in any stage of the energy supply chain. The CAT does not evaluate commitments by non-state and subnational actors. Databases can be used to assess whether funding is ongoing / has happened in the recent past (Table 5).

Table 5: Examples of data sources used to track fossil finance

Data source	Description	Link	Updates
Database *Global Coal Public Finance Tracker*	Public coal finance at project level, realized and planned.	Coal finance	Frequent
Report *G20 Governments Continue to Finance the Climate Crisis*	Fossil fuel finance for top 12 G20 countries broken down by public finance institution.	Link	Once a year

5.3 Aggregating components into an overall climate finance rating

The components described above provide an overview of the status of climate finance for each country. We also provide an overall finance rating to summarise the findings and to build into the final overall CAT rating for each country.

The finance rating combines the answers to each question in a weighted manner. While all questions are important, we give more weight to the 'current contributions' question (Q1) that assess the volumes of finance delivered. Furthermore, for Q1 regarding the historic contributions from countries we give a score on a continuous scale to best reflect the different amounts of finance provided. The remaining questions are more qualitative and are instead given a numerical score tied to the category that they are awarded.

A country's final score is the sum across all four questions divided by the maximum total to give a score out of one. The scores and weighting assigned to each question are show in Table 6.

Table 6: Scores and weighting assigned to each question and possible answers. A countries' final score is its sum across all four questions divided by the maximum total to give a score out of one.

Q1 How do current international finance contributions compare to distinct benchmarks?	Contributions are way above a threshold based on the USD 100 billion commitment and in line with least-cost global mitigation	**up to 200**
	Contributions are above doubling the USD 100 billion commitment	up to 150
	Contributions are below a threshold based on doubling the USD 100 billion commitment	up to 100
	Contributions are below a threshold based on the USD 100 billion commitment	up to 50
	Country has not provided international climate finance according to the CAT's criteria	0
Q2 Has international support for climate mitigation increased or decreased in the past years?	Contributions clearly increased over time	**25**
	Contributions show no clear trend	12.5
	Contributions are below a threshold based on the USD 100 billion commitment	0
Q3 Has the country committed to further support in the future?	Country has a binding and transparent commitment to increase climate finance	**25**
	Country has committed to future support with a clear signal to increase climate finance	16.7
	Country has committed to future support, but did not announce an increase in climate finance	8.3
	Country has not committed to future support	0
Q4 Has the country ended or does it have a commitment to end provision of public finance for fossil fuels internationally?	Country has committed to and stopped funding fossil fuels abroad	**25**
	Country has stopped funding fossil fuels abroad but has not made an explicit commitment	16.7
	Country has made a commitment to stop fossil fuel finance, but still invests in fossil fuels abroad	8.3
	Country has not committed to stop fossil fuel finance and still invests in fossil fuels abroad	0

The weighted score is then used to assign the country one of five finance ratings. We use five levels to allow for differentiation between countries but it is currently not feasible to define "Paris compatible" or associate end-of-century temperature warming with these levels, as is done in the fair-share or modelled domestic pathway approaches.

Table 7: Minimum thresholds for each climate finance rating category based on weighted scores

Finance rating	Total minimum score required
Good	0.8
Nearly sufficient	0.6
Insufficient	0.4
Highly insufficient	0.2
Critically insufficient	0

5.4 Finance data sources and sensitivity of results

5.4.1 DAC database

Definitions of financial contribution types included in the database

The DAC database includes commitments and disbursements. Pledges are excluded. Below we present the definitions as presented in *DAC Glossary of Key Terms and Concepts* (OECD, n.d.).

> "A pledge is usually a political announcement of intent on behalf of a donor to contribute a certain amount to a certain area, e.g., Japan, the European Union and the United States made pledges at the WTO's Hong Kong Ministerial Conference in December 2005 to increase support for aid for trade.
>
> A commitment is a firm obligation, expressed in writing and backed by the necessary funds, undertaken by an official donor to provide specified assistance to a recipient country or a multilateral organisation.
>
> Bilateral commitments are recorded in the full amount of expected transfer, irrespective of the time required for the completion of disbursements. Commitments to multilateral organisations are reported as the sum of (i) any disbursements in the year reported on which have not previously been notified as commitments and (ii) expected disbursements in the following year.
>
> A disbursement is the release of funds to or the purchase of goods or services for a recipient; by extension, the amount thus spent. Disbursements record the actual international transfer of financial resources, or of goods or services valued at the cost to the donor. In the case of activities carried out in donor countries, such as training, administration or public awareness programmes, disbursement is taken to have occurred when the funds have been transferred to the service provider or the recipient. They may be recorded gross (the total amount disbursed over a given accounting period) or net (the gross amount less any repayments of loan principal or recoveries on grants received during the same period). It can take several years to disburse a commitment."

Criticism

The DAC database presents a harmonised dataset, that relies on standard definitions. However, it has many limitations – many of which are a result of the remaining lack of commonly accepted and implemented definition of international climate finance (Carty *et al.*, 2020; Roberts *et al.*, 2021; Weikmans & Roberts, 2019). The database includes:

- types of finance that might be inadequate under equity considerations, including non-concessional loans
- developmental finance that supports fossil fuels, including coal
- finance that is not new or additional
- finance that may be only partially mitigation related
- private finance

These limitations are critical. Yet, the level of detail provided in the database enables its manipulation to account for and oftentimes address these issues. Other datasets estimate lower contributions totals by excluding some of the finance based on reasons above, although estimates vary substantially (Carty *et al.*, 2020; Roberts *et al.*, 2021).

Alternative data sources

Country-reported data submitted to UNFCCC

The CAT also considered using country-reported data submitted to the UNFCCC in the tabular format of Annex-I countries Biennial Update Reports (BUR). This option was discarded due to:

- **Inconsistent reporting for the period covered by the data:** For several Annex-I countries data between 2012 and 2016 is inconsistently reported and large fluctuations exist. The only exceptions are EU, Norway, Canada and Switzerland.
- **Lack of project detail:** Due to the different interpretations of what qualified as international climate finance, to analyse the data on the project level is paramount for a robust assessment. In the UNFCCC data, most projects are marked as cross-cutting sectors and as both mitigation and adaptation. The lack of detail does not allow for the filtering of fossil-fuel-related projects or a consistent definition of what is considered climate-specific, instead of general overseas, development assistance finance.

Compilation reports

Another option is to use other reports that compile global climate finance flows. Such as the those by the Climate Policy initiative or the UNFCCC compilation report: Biennial Assessment and Overview of Climate Finance Flows. These reports provide a good overview of overall volume and global trends but do not provide sufficient national detail, that allow for a comparable assessment across countries.

6 Land use and forests

6.1 Why Land-Use, Land-Use Change, and Forestry (LULUCF) matter and why we highlight some countries

The main components of the CAT rating system assess emissions excluding those from LULUCF and forestry. Emissions and removals from forestry are of very different nature, they are very volatile from one year to the next and the removals during biomass growth can be reversed into emissions through human activity, natural factors, and increasingly through the effects of climate change on forests and soil carbon via more extreme and frequent heat waves, drought and wildfire. We consider it is more important to make clear what's happening with emissions from fossil fuels and industry rather than mixing targets with sinks through land use and forestry.

However, LULUCF is both a major source and sink of emissions on the global level, and a major share of emissions for some individual countries. Reducing LULUCF emissions and enhancing removals will be crucial for limiting warming to 1.5°C.

LULUCF can also play a major role in how emissions reductions are counted toward meeting a country's climate target and has been used by governments to obscure a lack of progress in reducing fossil fuel emissions.

We therefore highlight those countries for which emissions sources and sinks from LULUCF are high compared with emissions from fossil sources. We do this to indicate where policies for limiting emissions and preserving sinks are especially important.

A more detailed and nuanced analysis and rating of LULUCF emissions will be developed in the coming years and more explanation of how we treat LULUCF, and why it matters, can be found on our website.

6.2 Identifying countries to flag

The CAT flags LULUCF as an issue only for countries where LULUCF results in LULUCF emissions that are higher than 20% of other GHG emissions or removals that are larger than 20% of other GHG emissions.

We do this by:

- Determining the proportion of LULUCF emissions or removals as compared to emissions from all other sources through time.
- Flagging any country where the average share of net emissions and removals over the last 20 years is >20%.
- Flagging any country where the maximum share of emissions or removals in the last 30 years is >30%.

Finally, we also flag countries where both LULUCF emissions and removals are high but the two cancel each other out when assessing net emissions. Flagging these countries is important because it shows the potential for either to be a major contributor to overall emissions and highlights the significance of land-based emissions in that country.

6.3 Data and method details

Our primary analysis and results are based on the same data that the CAT uses for the country analysis. Country reported data – either to the UNFCCC or in national documents – is prioritised. We do this to be consistent across the different elements of CAT analyses.

As LULUCF data is highly uncertain, we also tested our approach using other datasets, including UNFCCC data only (only that available on the GHG interface of the UNFCCC website) and data reported by the FAO. The UNFCCC and CAT data commonly yield the same, or very similar, results because the CAT commonly uses UNFCCC data where available. However, in some cases the CAT uses alternate national sources, especially when data reported to the UNFCCC is sparse.

Differences between FAO and UNFCCC reported data are due to differences in the emissions accounting approaches used for each dataset and the way in which land uses are defined (Federici *et al.*, 2015). These different approaches may then highlight different aspects of land-use activities.

We pay particular attention to countries where "net" LULUCF emissions are low but are the result of high emissions and significant sinks balance each other out. Where data is available (all Annex I countries), we check LULUCF sources and sinks in addition to the net emissions. Based on this, we may flag additional countries and potentially as both a source and a sink. Canada is one example that has both significant emissions and sinks from LULUCF that mostly balance each other out.

7 Defining an overall rating

7.1 So, after all of the above, how do we determine an overall rating for a country?

All aspects of climate mitigation action are important – targets, policies, climate finance. So we rate them separately and then combine these components for all into a single "overall" rating.

Some principles used for defining the final rating are:

- Both **Policies and action**, and **targets**, are important – governments must do well on both to get a good rating. Both are given equal weight.
- Both the fair-share and full decarbonisation perspectives are important – governments should do well in both spaces to provide their fair contribution and get on track toward full decarbonisation. Both spaces are given equal weight as far as possible when combining different elements.

A government's **current policies** are rated against what we expect that country to do within its borders under its own resources. Some countries need support to advance their current policies and so we rate their current policies according to fair-share contributions. Others can reduce emissions without support from others and we rate those countries against what's needed for full decarbonisation.

Country **targets** are rated as a package – we combine the two target ratings (domestic or internationally supported target and the fair share target) by averaging. For countries with a climate finance rating, we first combine the fair share target rating and climate finance rating – a good climate finance rating can help to improve the fair share target rating.

To get the **overall rating**, we combine these policies and targets ratings by averaging. Where a country falls between two categories, we take the poorer rating because countries need to be acting on all fronts to fully meet their climate contributions and get a good rating.

Finally, some countries have particular circumstances that we also take into account, such as not specifying an unconditional target. These considerations are explained or highlighted on the country page where relevant.

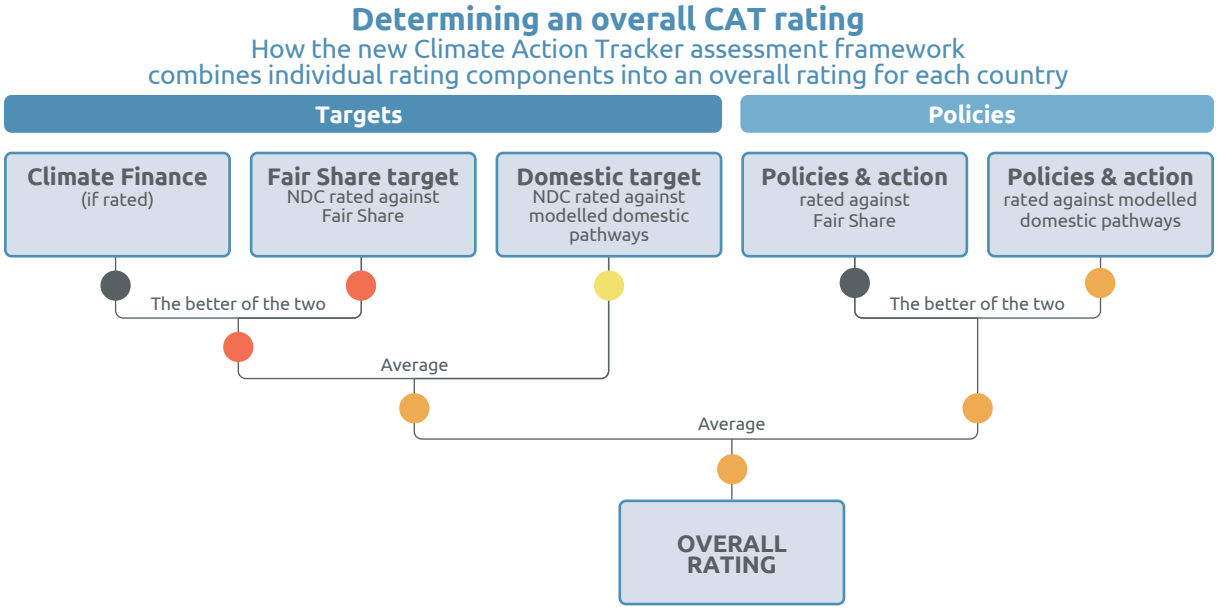

Figure 8: Method for determining the overall rating for a country.

7.2 What does it take for a country to get a "1.5°C Paris Agreement compatible" rating?

Countries whose fair-share rating means they need to be both ambitious at home and support others (usually developed countries) need to do just that. They need to:

- Set domestic targets consistent with at least the 1.5 global least cost pathways
- Implement policies that will meet those targets
- Work with other countries in achieving emissions reductions, either through bilateral agreements or through providing climate mitigation finance.

To achieve an overall 1.5°C Paris Agreement compatible rating, these governments need to achieve a Paris compatible rating on policies and action, domestic targets, and on international support.

Countries who will need support to fully decarbonise (usually developing countries) should:

- put forward targets that put them on track to full decarbonisation
- outline the support they need to meet those targets
- put in place the policies that make sense within their own resources

To achieve an overall 1.5°C Paris Agreement compatible rating, these countries need to do what they can using their own resources and make plans for what could be done additionally with support.

Some countries are in between the two categories, i.e., our method does not decisively determine if they should provide or receive support. In this case the two assessment frameworks (fair share and modelled domestic pathways) yield very similar results. These countries need to:

- put forward targets that put them on track to full decarbonisation
- put in place the policies that make sense within their own resources

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The Climate Action Tracker (CAT) is an independent scientific analysis produced by two research organisations tracking climate action since 2009. We track progress towards the globally agreed aim of holding warming well below 2°C, and pursuing efforts to limit warming to 1.5°C.

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